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Economic Research Aid

PHYSICAL LAYOUT AND PRODUCTION
AT THE DNEPROPETROVSK MISSILE DEVELOPMENT
AND PRODUCTION CENTER
IN THE USSR



CIA/RR A.ERA 63-3

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CENTRAL INTELLIGENCE AGENCY

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FOREWORD

This research aid is concerned with the physical layout of the Dnepropetrovsk Missile Development and Production Center (DMDPC), one of the most important installations in the USSR engaged in research, development, and production of ballistic missiles. The DMDPC probably is involved in the development and production of the SS-7 ICBM, a second-generation ICBM that constitutes the backbone of the present Soviet ICBM force. This research aid provides only a basic descriptive reference of the DMDPC, portraying the physical plant as it now stands and as it was developed to support Soviet ballistic missile programs during the 1950's. Other reports* cover the history of this facility, its position in the Soviet ICBM program, and nonmilitary production at this key facility. Although available information does not permit an accurate estimate of rates of production, the layout of the facility can provide a probable flow pattern for fabrication and assembly of missiles and rocket engines to permit estimates of rates of production.

Most of the information used in this research aid covers the years before 1960, and it therefore is recognized that some changes may have occurred since then. These changes, however, are not believed to have altered significantly the physical layout or the capability of the facility.

* CIA/RR G.CG 60-7, Dnepropetrovsk Automobile Plant No. 186 (DAZ), July 1960, SECRET, and CIA/RR A.ERA 61-2, Production of Belarus' Tractors at the Dnepropetrovsk Automobile Plant No. 186 (DAZ), May 1961, SECRET/NOFORN [REDACTED]

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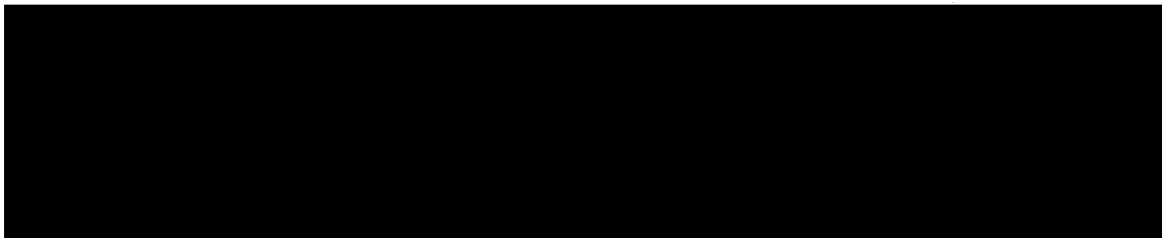
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PHYSICAL LAYOUT AND PRODUCTION
AT THE DNEPROPETROVSK MISSILE DEVELOPMENT AND PRODUCTION CENTER
IN THE USSR*

Summary and Conclusions

The examination of all available information indicates that the Dnepropetrovsk Missile Development and Production Center (DMDPC) in the USSR has a minimum floorspace of approximately 7.3 million square feet (sq ft), not including a reported test area. Within this area the USSR is believed to be currently producing rocket engines, ballistic missiles, and possibly ground-support equipment for the IRBM and ICBM systems, as well as Belarus' tractors and Dnepr refrigerators. The over-all assessment of the available floorspace indicates that the DMDPC has adequate facilities to carry on all of these activities at volume production rates.

From a number of sources the annual production of both tractors and refrigerators can be established firmly for the past few years, and reasonable estimates can be made of the floorspace required to produce these civilian products. It is probable that the remaining area at the DMDPC is allocated entirely to missile-related production, in some manner distributed to production or assembly of rocket engines, missiles, and ground-support equipment. Accordingly, it is estimated that, since 1957, floorspace in square feet at the DMDPC has been allocated approximately as follows:

	<u>Million Square Feet</u>
System development and production of missiles, engines, and ground- support equipment	5.4
Production of Belarus' tractors	1.8
Production of Dnepr refrigerators	0.14
	<u>7.3</u>

* The estimates and conclusions in this research aid represent the best judgment of this Office as of 15 February 1963.

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The area devoted to missile-related activity is considerably more than that utilized for missile fabrication and assembly at Scientific Research Institute/Plant (NII) No. 88 in Kaliningrad -- the other major Soviet ballistic missile developmental center -- which currently is estimated to have a total roof cover of 2.5 million sq ft.*

With more than 5 million sq ft of floorspace continuously available for development and production of missile systems, there seems to be no doubt that the DMDPC has the capability to produce large quantities of missile airframes and rocket engines. Estimates of actual monthly rates of production, however, will vary, depending on assumptions made for assembly flowtime, number of work shifts, capacity of the test facilities, quantities of ground-support equipment produced, and the proportionate amount of subcontracting that may be involved in a typical Soviet missile program.

Although no specific peak in the capability for production of missiles at the DMDPC is known, the reported initiation of missile manufacture, the timing of construction of new facilities at the center, and Soviet missile requirements all indicate that this center probably has been a major producer of the Soviet SS-1 SRBM, the SS-3 and SS-4 MRBM's, the SS-5 IRBM, and the second-generation SS-7 ICBM.** The rates of production for these systems, when paced to probable Soviet deployment schedules, appear to be within the capability of the DMDPC alone, if the USSR should elect to keep all production at this facility. It seems more reasonable, however, to assume that production of each system also was phased into other "follow-on" plants capable of followup volume production. Such a choice would provide the DMDPC with greater flexibility and would allow it to devote a major effort and a substantial area to fabrication of advanced developmental missile systems.

* The roof cover of the DMDPC is about 5.9 million sq ft.

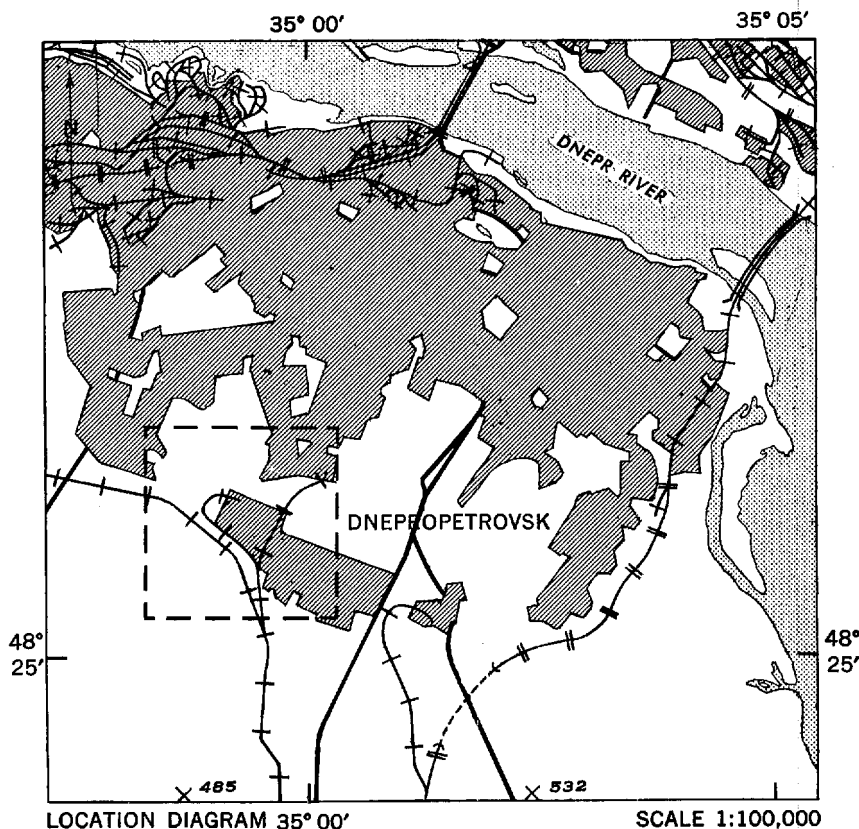
** The designations are those of US intelligence.

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I. Introduction

The DMDPC is located in the southern outskirts of the city of Dnepropetrovsk ($48^{\circ}26'N$ - $34^{\circ}59'E$) in the USSR, approximately 7.8 kilometers (km) from the center of the city, 10 km north-northwest of Volozhskoye airfield, and 4 km north-northeast of Krasnopol'ye (see the location diagram). The DMDPC is divided between two plants, [REDACTED] 25X1D0a



25X1D0a

[REDACTED] which are physically separated by the local Dnepropetrovsk-Dneprodzerzhinsk railroad line.

These two basic facilities originally were established as separate but mutually supporting plants. It is believed that they have operated somewhat independently in production of consumer goods. [REDACTED] 25X1X6

25X1X6 [REDACTED] indicate clearly that for military production the two plants were combined into one complex under the Ministry

25X1X6

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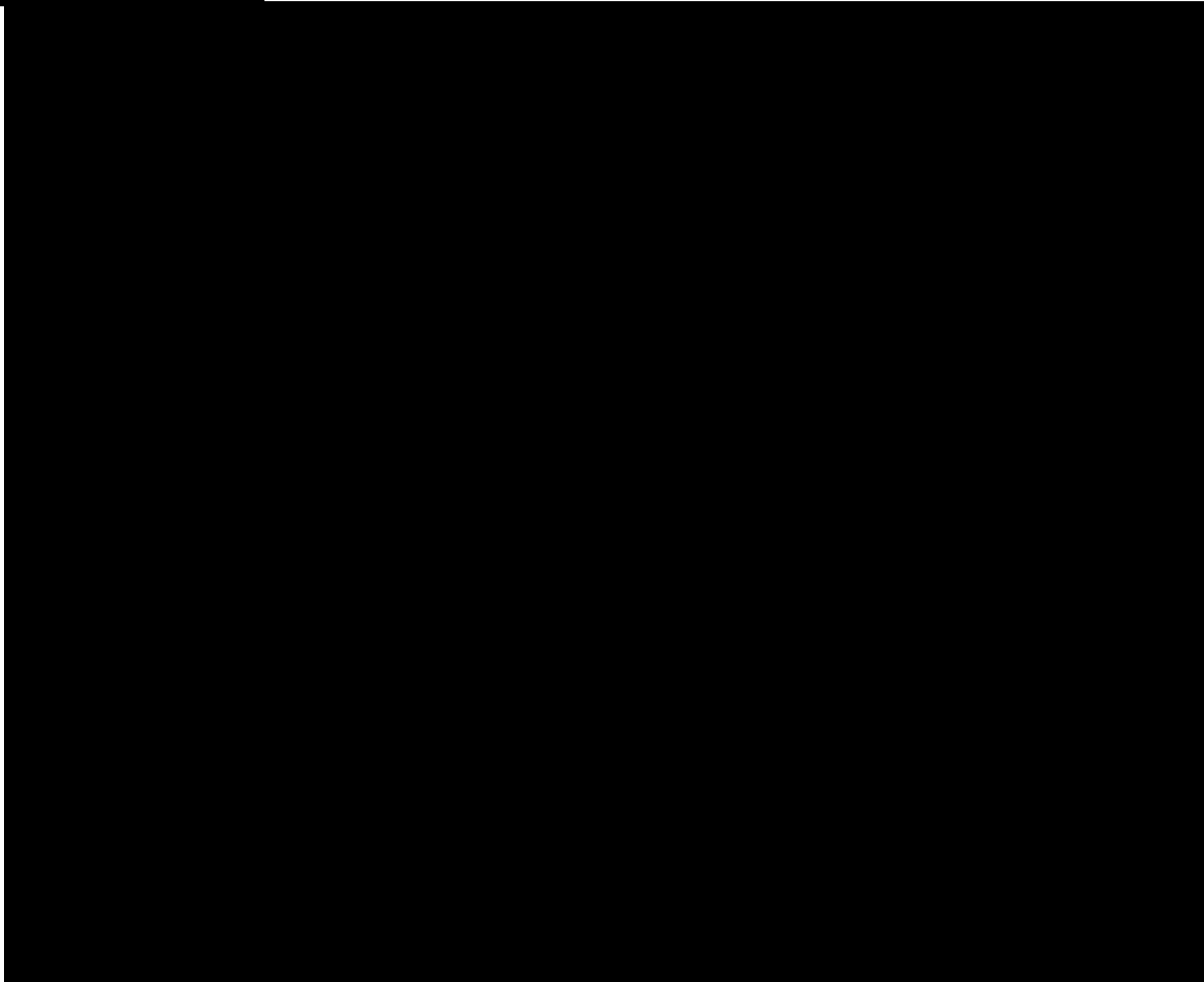
of Defense Industry as early as 1951 and have since operated as one production unit.

It is believed that the two plants, supported by a test area directly southwest of the complex, operate as a ballistic missiles development and production center.

II. Description of Individual Facilities

A. [REDACTED] 25X1D0a

25X1D0a [REDACTED] is located in the northern section of the DMDPC. It is bounded by Rabochaya Ulitsa on the east, by Krugovaya Ulitsa on the north, and by the local Dnepropetrovsk-Dneprodzerzhinsk railroad line on the south and west. Construction of this installation, 25X1D0a known as the Dnepropetrovsk Automobile Plant (DAZ), was begun in 1945 [REDACTED] 25X1D0a The announced purpose of this plant was production



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of ZIS-150 trucks. At the time that construction was undertaken, a Moscow newspaper stated that the total floorspace of the plant shops on completion would be 4.5 million sq ft. Construction plans published in 1946 specified the use of a total plant area of approximately 500 acres and the erection of 70 industrial types of buildings (see the photograph). A section of the plant was scheduled for completion in 1947, and the total area was to be in operation by 1949.



The plant never became an independent producer of trucks. By 1950 the plant was partly completed and was engaged in mounting dump bodies and cranes on truck chassis shipped from the ZIL plant in Moscow. Late in 1950 and early in 1951, production related to trucks decreased, and military personnel made frequent visits to the plant. It became obvious that a major shift in activity was contemplated. Late in 1951 the subordination of DAZ was shifted to the Ministry of Defense Industry. At this time the plant included that part of the layout (see Figure 2*) which is indicated in red. During the next few years the plant, still commonly known as DAZ, was expanded considerably. An administration building was built to the north, laboratories to the east, warehouses to the south, and assembly buildings to the west, and there are reports of the plant undertaking production of rocket engines (developed at Khimki) in the 1951-52 period. Following the death of Stalin in 1953 and the subsequent attention of the new leadership -- notably Khrushchev -- on urgent domestic problems, DAZ was among the facilities of the defense industry that were given the task of undertaking major production of agricultural machinery, in this case the Belarus' tractor. The plant expansion of 1952-53 provided suitable facilities for production of the Belarus' tractor, which began in 1954.

* Inside back cover.

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25X1D0a



That part of the DMDPC represented [REDACTED] 25X1D0a
currently is estimated to have at least 5.76 million sq ft of floor-
space. On the basis of [REDACTED] 25X1D0a

other information, it is possible to determine the general type of
production process involved for most buildings in this part of the
complex. In general, [REDACTED] is engaged in heavy and 25X1D0a

light forging and casting, precision grinding and stamping, experi-
mental and developmental work, and major and minor assembly. Known
end products coming from this section of the DMDPC include tractors
and probably missile engines. Inclusion of the latter product is
justified on the basis of collateral reports indicating the manufac-
ture of engines in the [REDACTED] area and the fact that 25X1D0a

25X1D0a the [REDACTED] area was not completed when work on missile en-
gines first began at DAZ in the early 1950's. It is not possible,
however, to determine with confidence which specific buildings or
portions of buildings are assigned to civilian as opposed to military
production. Likewise, the administrative-organizational relationship
between these two elements is not known.

25X1D0a

The [REDACTED] part of DMDPC also appears to be the
most reasonable location for the forming and the shaping of raw stock
in support of the fabrication and the final assembly of missile air-
frames that probably takes place in the [REDACTED] area. 25X1D0a

25X1D0a The probable hydrostatic test facility in the southeastern section of
the [REDACTED] area suggests that the surrounding laboratory
area is concerned with system developmental work.

B. [REDACTED] 25X1D0a

25X1D0a [REDACTED] located immediately south of the Dnepro-
petrovsk-Dneprodzerzhinsk railroad line, also is known as the Dneprope-
trovsk Machine Building Plant. Initial construction activity apparently
took place soon after World War II and was well underway during the
period 1949-51. Informants have stated variously that the plant was to
be fully operational by 1954, 1956, and 1960. It seems evident that
considerable construction was going on at least as recently as 1956.

* Following p. 6.

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25X1D0a

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25X1D0a The plant was frequently called the "Shinnyy Zavod" (Tire Plant) and was designed to become an independent supplier of tires for the auto-mobile plant. From the outset it was known to be affiliated with [REDACTED] 25X1D0a
25X1D0a [REDACTED] A reported visit by high-ranking military officials in 1950 suggests that [REDACTED] probably became subordinate 25X1D0a
25X1D0a to the Ministry of Defense Industry at the same time as [REDACTED] 25X1D0a
[REDACTED] and that the nature of its planned activity was then changed.

Various sources have indicated that some portion of the large assembly building in this area (Building No. 50, Appendix B*) was in operation at least by 1955 and reportedly was engaged in missile-related production. The completion of this building, probably in 1956, ties in with the belief that the DMDPC undertook fabrication of missiles sometime in 1956. The size and characteristics of this building and those in the immediate area, as well as the date of construction, make the building a most logical choice for assembly of missiles.

III. Over-All Production

A. General

With reference to the utilization of floorspace at the DMDPC, there is no evidence that the DMDPC is involved in any type of production other than that already mentioned -- that is, Belarus' tractors, Dnepr refrigerators, and missile-related items. Because information is available on areas within the DMDPC where certain types of production functions take place, it is possible to specify with some confidence those areas where the major missile work probably takes place. Information identifying areas of known production is examined below, with the floorspace for missile-related production being treated as a residual, although major, portion of the DMDPC, after the space allocated to known production has been delineated.

B. Production of Tractors at [REDACTED] 25X1D0a

In the fall of 1953 when the defense industries of the USSR were directed to assist in the fulfillment of programs aimed at the increased production of tractors, [REDACTED] was one 25X1D0a
of the plants assigned to production of Belarus' tractors. The estimated output of Belarus' tractors at this plant during the period 1954-62 is shown in the following tabulation:

* P. 19, below.

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<u>1954</u>	<u>1955</u>	<u>1956</u>	<u>1957</u>	<u>1958</u>	<u>1959</u>	<u>1960</u>	<u>1961</u>	<u>1962*</u>
6,500	15,100	29,700	30,200	32,000	31,400	31,500	31,500	20,000

On the basis of the floorspace requirements of the Minsk Tractor Plant to produce some 45,000 Belarus' tractors and engines in 1962, it is estimated that approximately 1.8 million sq ft of floorspace at [REDACTED]

25X1D0a

25X1D0a

[REDACTED] is required to support output of tractors at observed levels.** Published plans for the future total Soviet production of tractors, when examined in conjunction with plans for the considerable expansion and modernization of the Minsk Tractor Plant, suggest that, by 1965, [REDACTED] no longer will be involved in production of tractors.

25X1D0a

It is believed that production of tractors currently continues in the northern section of [REDACTED] where it originally was reported during the middle and late 1950's. At the time of the decision to produce the Belarus' tractor at DAZ in 1953, the floorspace in this section was in excess of 1.5 million sq ft. Since that time, this section of the plant has been enlarged to more than 3 million sq ft. Throughout the entire time period, therefore, the floorspace available in this section of the plant has been more than adequate to handle the estimated rates of production of Belarus' tractors.

25X1D0a

C. Production of Refrigerators at [REDACTED]

25X1D0a

The Dnepr refrigerator has been produced at [REDACTED] at least since 1957, increasing from an annual rate of approximately 42,000 units in that year to an estimated output of more than 80,000 during 1962. This level of production probably can be accommodated in an area of 140,000 sq ft or less. A variety of combinations of several of the smaller buildings in the [REDACTED] area therefore could provide the facilities needed for production of refrigerators.

25X1D0a

25X1D0a

25X1D0a

D. Missile-Related Production

1. Rocket Engines

The DMDPC is believed to have become involved in missile-related production initially late in 1951, when the facility was [REDACTED]

25X1B4d

** The article cited in the footnote, above, indicates that at least some of the Belarus' engines are produced at the Yaroslavl' Engine Plant.

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transferred to the Ministry of Defense Industry. At first the DMDPC produced rocket engines under the guidance of [REDACTED] the major Soviet facility for rocket engine research and development, located at Khimki. Production of rocket engines is known to have been centered at [REDACTED] presumably in the area then available in the northern section of the present plant. Information [REDACTED] clearly indicates that production of engines continued at least through 1956, and reports of engine test noises persist into the 1960's. There is and has been considerable floorspace in this section of the plant that would not be required for production of tractors and therefore is presumably available for manufacture of rocket engines, as indicated in A.*

2. Missile Airframes

The DMDPC is not believed to have become involved in the fabrication and/or the assembly of missile airframes earlier than the 1955-56 period. The construction of the hydrostatic test tower and the completion of the major assembly building in the area of [REDACTED] support this opinion. Although there is no firm evidence as to how the DMDPC operates, from the point of view of assembly flow within the DMDPC, one likely operational mode would place assembly in the [REDACTED] area and fabrication in the southern half of the [REDACTED] area. The most probable location for the final assembly of missiles would be the large assembly type of building in the [REDACTED] area. The floorspace of this building appears to be more than adequate to handle the necessary welding of tankage, the assembly and the mating of various sections and subassemblies, the calibration, the installation of electronic equipment and wiring, and the final checkout of the complete missile. All of the components both for major and subassembly fabrication could come from the [REDACTED] area. The early known functions of certain buildings in this area are entirely compatible with this allocation of activity.

3. Ground-Support Equipment

Fragmentary evidence suggests that some elements of ground-support equipment also are manufactured at the DMDPC. Although there is no firm evidence as to where within the DMDPC this activity may be carried on, its requirements as to floorspace suggest that the [REDACTED] area is the best choice.

* P. 7, above.

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25X1D0a

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APPENDIX C

METHODOLOGY

25X1X6 The main portion of this research aid, presenting a floor plan and functional description of the DMDPC, is based primarily on information received from [REDACTED] 25X1D0a There is such a large quantity of this information and so much divergence therein that considerable personal judgment was required in selecting those reports which seemed most useful to provide a basis for the floor plan. When possible, the information from these reports was checked against the small amount of firm information on layout of the DMDPC available from other sources. For example, [REDACTED] 25X1D0a [REDACTED] was used extensively as a check on the information received from [REDACTED] 25X1X6 On the average the dimensions given should be interpreted as accurate within less than plus or minus 25 feet. In spite of the sometimes variable quality of individual measurements or estimates as they pertain to individual buildings, it is believed that the over-all numerical data on floorspace are quite realistic.

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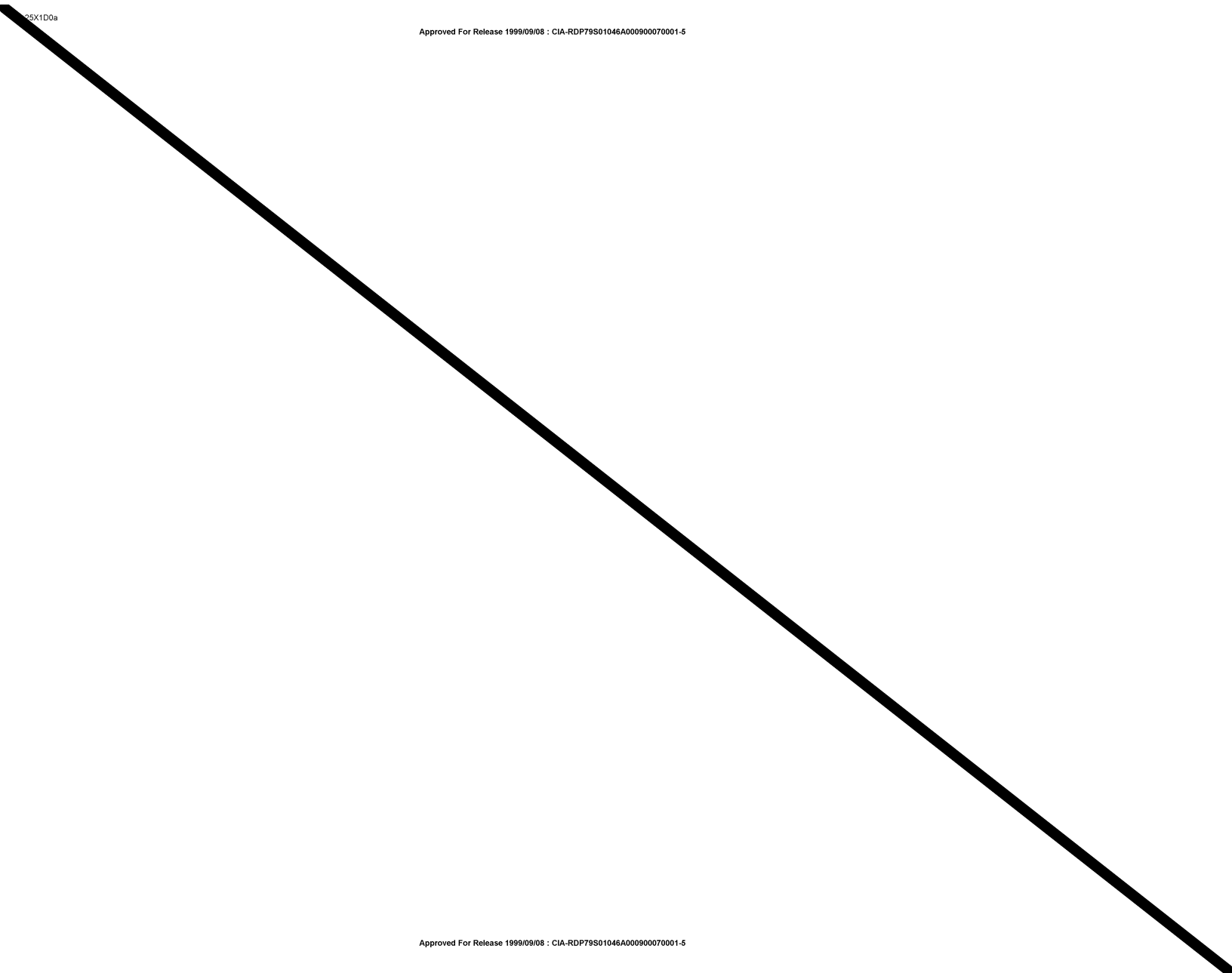
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Analyst: [REDACTED] M/GMP 25X1A9a

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